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10/825,373	04/16/2004	Atsushi Sakai	251943US2	8393

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EXAMINER

DOAN, JENNIFER

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 10/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/825,373

Applicant(s)

SAKAI ET AL.

Examiner

Jennifer Doan

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-19 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☒ Claim(s) 2, 4-15 and 18 is/are allowed.  
6) ☒ Claim(s) 3, 16, 17 and 19 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

Applicants' amendment filed on June 29, 2006 has been considered and entered.

The arguments advanced therein are persuasive; thus, claims 2, 4-15 and 18 are now allowed. In view of scrutiny of the claims, it is discovered that the Suhami (U.S. 2004/0175174) reference is still pertinent to claims 3, 16, 17 and 19. Therefore, the previous rejection for these claims is maintained. In addition, a newly cited reference is also found applicable to the claims; therefore, a new rejection is set forth below. This action is made final.

### ***Specification***

1. Applicants' cooperation is requested in correcting any errors of which applicants may become aware in the specification.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 3, 16, 17 and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Suhami (U.S. 2004/0175174).

With respect to claim 3, Suhami (figures 11 and 12) discloses a light control element comprising a substrate (54); a plurality of optical waveguides (53, 58) formed on the substrate (54); an optical coupling component provided on the substrate, at least three of the optical waveguides being coupled to the optical coupling component (see paragraph [0209]); and a photonic crystal formed on at least one of the optical waveguides at an end part thereof coupled to the optical coupling component (see claim 15, lines 9-10), the light control element changing a transmittance of light through the optical waveguide in a part corresponding to the photonic crystal structure in response to a change of refractive index of the photonic crystal structure (see paragraph [0152]).

With respect to claim 16, Suhami (figure 11) discloses a light control element comprising a substrate (54) having a photonic crystal structure; a plurality of optical waveguides (53, 58) formed in the photonic crystal structure in the form of a line defect of the photonic crystal structure (see paragraph [0207] and figure 11); and a variable refractive index part formed in an optical coupling part, the optical coupling part forming an intersection point where the optical waveguides (53, 58) intersect with each other (see figure 11), the light control element controlling a state of resonance in the optical coupling part by changing a refractive index of the refractive index variable part (see paragraphs [0207] and [0208]).

With respect to claim 17, Suhami (figure 11) discloses a light control element comprising a substrate (54) having a photonic crystal structure; a plurality of optical

waveguides (53, 58) formed in the photonic crystal structure of the substrate in the form of a line defect of the photonic crystal structure so as to divide the photonic crystal structure into plural regions (see figure 11); and variable refractive index parts each formed in one of the respective regions of the photonic crystal structure defined by the optical waveguides, each of the variable refractive index parts including a first photonic crystal part and a second photonic crystal part divided from each other diagonally (see figure 11 and paragraphs [0207] and [0208]), the light control element (61) changing a refractive index of the first and second photonic crystal parts in each of said regions independently (see paragraph [0152]).

With respect to claim 19, Suhani (figures 11 and 12) discloses the light control device, wherein the plurality of optical waveguide comprises  $N \times N \times N$  optical waveguides formed on the substrate so as to cross with each other at intersections distributed two-dimensionally on the substrate (see paragraph [0207]).

#### ***Allowable Subject Matter***

4. Claims 2, 4-15 and 18 are allowed.

Please see the allowable subject matter of claims 4-8 in the previous office action.

The prior art fails to disclose or reasonably suggest a light control element, wherein an interface between said regions changes a traveling direction of a light incident thereto by causing reflection in at least one wavenumber of the light in

response to a change of refractive index in said variable refractive index part in combination with the other limitations of claim 2.

Claims 9-15 depend from claim 2.

The prior art also fails to disclose or reasonably suggest a light control element, comprising N2 optical coupling components each provided to one of the intersections of the optical waveguides, wherein an interface between said regions changes a traveling direction of a light incident thereto by causing reflection in at least one wavenumber of the light in response to a change of refractive index in the variable refractive index part in combination with the other limitations of claim 18.

### ***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 3 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki (U.S. 7,110,630).

With respect to claim 3, Suzuki (figure 12) discloses a light control element comprising a substrate; a plurality of optical waveguides (31, 32) formed on the substrate (see figure 12); an optical coupling component provided on the substrate, at least three of the optical waveguides being coupled to the optical coupling component; and a photonic crystal formed on at least one of the optical waveguides at an end part thereof coupled to the optical coupling component (see column 11, lines 20-65), the light control element changing a transmittance of light through the optical waveguide in a part corresponding to the photonic crystal structure in response to a change of refractive index of the photonic crystal structure (column 1, lines 14-27).

With respect to claim 17, Suzuki (figure 12) discloses a light control element comprising a substrate having a photonic crystal structure (see figure 12); a plurality of optical waveguides (31, 32) formed in the photonic crystal structure of the substrate in the form of a line defect of the photonic crystal structure so as to divide the photonic crystal structure into plural regions (see figure 12); and variable refractive index parts each formed in one of the respective regions of the photonic crystal structure defined by the optical waveguides, each of the variable refractive index parts including a first photonic crystal part and a second photonic crystal part divided from each other diagonally (see figure 12), the light control element changing a refractive index of the first and second photonic crystal parts in each of said regions independently (column 1, lines 14-27).

***Allowable Subject Matter***

7. Claims 2, 4-16, 18 and 19 are allowed.

Please see the allowable subject matter of claims 4-8 in the previous office action.

Please see the allowable subject matter of claims 2 and 18 in section 4 above.

The prior art fails to disclose or reasonably suggest a light control element, comprising the light control element controlling a state of resonance in the optical coupling part by changing a refractive index of the refractive index variable part in combination with the other limitations of claim 16.

Claim 19 depends from claim 16.

***Response to Arguments***

8. Applicants' argument filed on June 29, 2006 has been fully considered.

With respect to claims 2, 9-15 and 18, the arguments on page 10 of the remarks are persuasive; therefore, the previous rejection of the claims is withdrawn. Claims 2, 9-15 and 18 are now allowed.

With respect to claims 3, 16, 17 and 19, the arguments are not persuasive. The Suhami (U.S. 2004/0175174) reference is still pertinent to claims 3, 16, 17 and 19. Therefore, the rejection for these claims based on Suhami is still applied. Please see the 102(e) rejection above.



***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Doan whose telephone number is (571) 272-2346. The examiner can normally be reached on Monday to Thursday from 6:00am to 3:30pm, second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2874

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JD

October 10, 2006



**JENNIFER DOAN**  
**PRIMARY EXAMINER**